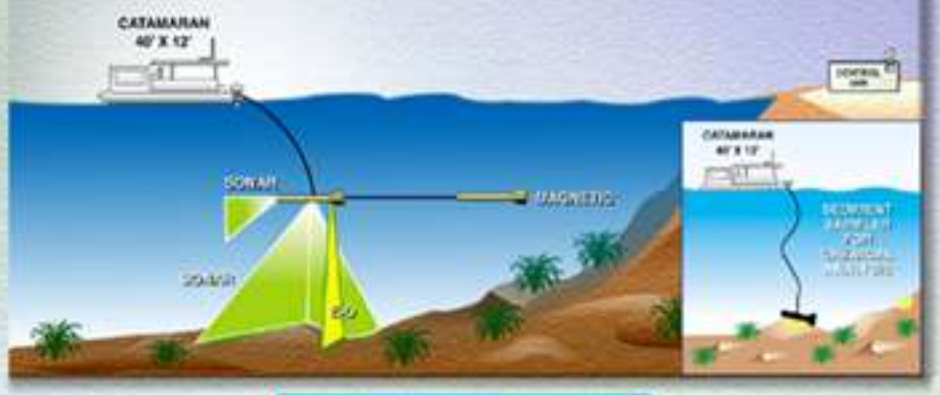
Naval Sea Systems Command

NAVAL SURFACE WARFARE CENTER

MUDSS

Mobile Underwater Debris Survey System

COASTAL SYSTEMS STATION



MELDING DEPARTMENT OF NAVY AND NASA TECHNOLOGY
FOR A CLEAN ENVIRONMENT

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MUDSS

The United States has 1,900 formerly used defense sites in need of remediation and cleanup. Of those, it is estimated that over 50 have large numbers of underwater unexploded ordnance in former target shooting, bombing and training areas. Right now, our nation has no effective method to survey these underwater sites and locate all the unexploded ordnance (UXO) for cleanup. Many problems exist. The small size of some of the ordnance, shallow water, other noises such as surface waves and reverberation which affect traditional sonar, murky water which diminishes visability, debris and clutter from other items in the area, and the fact that the ordnance may be buried in the sand or mud all contribute to making traditional survey methods unusable.

To help, the Strategic Environmental Research and Development Program (SERDP) has funded a 3 year joint US Navy and NASA technology demonstration program called the Mobile Underwater Debris Survey System (MUDSS). Tasked to develop the capacity to survey the seabed in shallow water environments, to locate, identify, record for future recovery or demolition such underwater debris as ordnance and explosive waste. MUDSS will be able to record, evaluate, identify and transfer the information to various locations. The MUDSS program will provide the tools necessary to find underwater unexploded ordnance--large and small--as well as other potential hazards to the fleet.

Currently, MUDSS uses a custom designed trailerable catamaran towing craft and 2 towed vehicles which house the underwater sensor suite. In the cabin of the catamaran is housed a radio transmitter that transmits all the processed sensor data back to a shore-based van housing data acquisition equipment, sensor operators, and survey directors. MUDSS also uses a small unmanned UV vehicle that can be deployed to collect sea bottom samples near suspected targets for the detection of trace amounts (as little as ten parts per trillion) of explosives. Reconfiguration of the sensor suite will make the MUDSS system usable from various vessels, including ocean-going.

MUDSS Demonstration Planning & Preparation

Several locations are being considered for MUDSS surveys for FY99. They are:

- Choctawhatchee Bay, Florida near Eglin Air Force Base (FY 99)
- Aberdeen Proving Ground Chesapeake Bay (FY 99 proposed)
- Former artillery test site at Ft. Sheridan, IL (FY 99 proposed)
- Massachusetts Bay site for location and removal of hazardous waste (FY 99 proposed)

Sensors Used By MUDSS

- *Superconducting Magnetic Field Gradiometer*
  Locates and magnetically classifies ferrous targets (including those deeply buried)
- *Low Frequency SAS*
  Synthetic aperture sonar operating at 20 kHz for high resolution (3" x 3") images for bottom and shallow buried targets
- *High Frequency SAS*
  Synthetic aperture sonar operating at 180 kHz which provides high resolution (6" x 6") images for bottom targets
- *Electro-optic Sensor*
  Laser linescanner that images targets at ranges up to three to five times as great as conventional optical systems with 1/4" x 1/4" resolution
- *Sea Bat Sonar*
  Commercially available ahead-look sonar operating at 455 kHz for target re-acquisition
- Mass Spectrometer
  Laboratory analyzer used to test bottom sediment samples (obtained near UXO targets) for traces elements of explosives

Potential Future Customers

Once the testing is complete, the MUDSS prototype will be available, to detect and identify underwater objects for such diverse customers as:

- Underwater survey and cleanup companies
- National Transportation Safety Board for debris location
- Archaeological sites
- Law enforcement search operations
- Environmental Protection Agency for remediation to standards surveys
- Marine Fisheries for environmental characterization

Expected Benefits

MUDSS will provide our nation with the capability to map the locations of ordinance from small shells to large bombs in all coastal and inland water with depths from a few feet to one hundred feet. It will allow rapid (approximately 1000 acres per day), cost effective (less than $100 per acre) surveying of cluttered areas for scores of underwater ordinance sites.

NAVAL SEA SYSTEMS COMMAND
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